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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,238	09/24/2003	Dennis R. Hollars	2500100-990131	8143
26379	7590	12/09/2004	EXAMINER	
GRAY CARY WARE & FREIDENRICH LLP			LE, DUNG ANH	
2000 UNIVERSITY AVENUE			ART UNIT	
E. PALO ALTO, CA 94303-2248			PAPER NUMBER	
			2818	

DATE MAILED: 12/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/671,238

Applicant(s)

HOLLARS, DENNIS R.

Examiner

DUNG A LE

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 52-64 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 52-55, 57-59, 62-64 is/are rejected.
- 7) ☒ Claim(s) 56, 60 and 61 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### *Oath/Declaration*

The oath/declaration filed on 9/24/03 is acceptable.

### *Election/Restriction*

Application's election **without traverse** of Group I (Claims 52-64) drawn to a semiconductor is acknowledged for prosecution in the subject application . Applicants have the right to file a divisional, continuation or continuation-in-part application covering the subject matter of the non-elected claims.

### **Information Disclosure Statement**

This office acknowledges of the following items from the Applicant:

Information Disclosure Statement (IDS) filed on 9/24/03 and made of record .

The references cited on the PTOL 1449 form have been considered.

### **Specification**

A new abstract is required that is clearly indicative the invention to which the claims are directed. Note that, the claims are directed to semiconductor device instead of to a method of making a semiconductor device.

### **Claim Rejections**

#### **Claim Rejections - 35 USC § 103**

**The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:**

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 52- 54, 56- 58 and 62- 64 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Background of Invention in view of Probst et al. (5626688).**

Background of Invention teaches a solar cell, comprising: a substrate; a conductive film disposed on a surface of the substrate; at least one p-type semiconductor absorber layer disposed on the conductive film, wherein the p-type semiconductor absorber layer includes a copper indium diselenide (CIS) based alloy material; an n-type semiconductor layer disposed on the p-type semiconductor absorber layer, wherein the p-type semiconductor absorber layer and the n-type semiconductor layer form a p-n junction; and a transparent electrically conductive top contact layer on the n-type semiconductor layer.

Background of Invention does not teach the conductive film includes a plurality of discrete layers of conductive materials.

Probst et al. teaches the conductive film includes a plurality of discrete layers 2/3 of conductive materials as cited in figs1-5.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to form the conductive film includes a plurality of discrete layers of conductive materials, in order to provide a solar cell that has improved adhesion between the substrate and the absorber layer, does not contain any additional toxic materials and has a production outlay that is not, or substantially not, increased compared to known methods.

**Regarding claim 53**, wherein the discrete layers of conductive materials comprise: at least one metallic layer 3 of material selected from one or more groups comprising copper, silver, aluminum, molybdenum, and niobium; and at least one barrier layer 2 of a transition metal nitride material. (col 5, line 5)

**Regarding claim 54**, wherein the barrier layer is selected from one or more groups comprising titanium nitride, zirconium nitride, and hafnium nitride (col 5, line 5).

**Regarding claim 57**, wherein the discrete layers of conductive materials comprise: a plurality of metallic layers 6 of material each selected from one or more groups comprising copper, silver, aluminum, molybdenum, and niobium; and a plurality of barrier layers 2 each of a transition metal nitride material (col 5, line 5).

**Regarding claim 58**, wherein the barrier layers 2 are each selected from one or more groups comprising titanium nitride, zirconium nitride, and hafnium nitride (col 5, line10).

**Regarding claims 62 and 63**, wherein the substrate 7 comprises thin metallic foil and wherein the thin metallic foil is selected from one or more groups comprising stainless steel, copper, and aluminum (col 6, line 56 and col 7. line 65).

**Regarding claim 64**, wherein the p-type semiconductor absorber layer has a graded bandgap (col 7, lines 20- 45).

**Claims 55 , 59 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Background of Invention in view of Probst et al. (5626688) and further in view of the following remark.**

**Regarding claim 55, Background of Invention and Probst et al. discloses the claimed invention as applied to claim 52, except for solar cell having the barrier layer comprises zirconium nitride.**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the barrier layer comprises zirconium nitride because the identified material is commonly used to prevent undesirable reactions in the contact region , since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use.

**Regarding claim 59, Background of Invention and Probst et al. discloses the claimed invention as applied to claims 52 and 57, except for solar cell having the barrier layer comprises zirconium nitride.**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the barrier layer comprises zirconium nitride because the identified material is commonly used to prevent undesirable reactions in the contact region , since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use.

*Reasons for Indication of Allowable Subject Matter*

Claims 56, 60- 61 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, since the prior made of record and considered pertinent to the applicant's disclosure does not teach or suggest the claimed limitations. Probst et al. (5626388) and Background of Invention individually or in combination, do not teach the claimed invention having **(Regarding 56)** wherein the discrete layers of conductive materials comprise: a first layer of copper; a second layer of silver; and a plurality of barrier layers each of a transition metal nitride material; **(Regarding claim 60)**, further comprising: a layer of metallic material disposed between the p-type semiconductor absorber layer and the n-type semiconductor layer.

If Applicants are aware of better art than that which has been cited, they are required to call such to attention of the examiner.

When responding to the office action, Applicants' are advice to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.




A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung A. Le whose telephone number is (571) 272-1784. The examiner can normally be reached on Monday-Tuesday and Thursday 6:00am- 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DUNG A. LE   
Primary Examiner  
Art Unit 2818